

He declared that the removal of a growth of the favorable type from the bladder is a simple and safe operation. The danger, if danger exists, lies in attacking carcinomata in their advanced stage or in ablating tumors of a benign type which have been long enough in existence to cause serious renal changes from backward pressure, or which have been suffered to enter the period of cystitis either by neglect or by maltreatment. Finally, he urges the necessity for regarding non-infiltrating tumors of the bladder in the same light which we are taught to look upon stone in the bladder. The sooner the operation is performed the better for the patient.—*British Medical Journal*, June 10, 1893.

EXTREMITIES.

Nerve Injuries Complicating Fractures of the Upper Extremity, with Six Cases. By E. DEANESLY, M.D. (Wolverhampton). Six cases have occurred at the General Hospital, Wolverhampton, during the past two and a half years, and the author thinks that nerve injuries of this kind are in reality of less rarity than might be supposed from the number of recorded cases. Many such cases are probably not detected, the symptoms being regarded as effects of disuse, or confused with the stiffness of joints and muscles which commonly occurs after fractures. Cases, too, in which nerve lesions have been produced by undue pressure of splints are, for obvious reasons, little likely to be recorded.

Of the six cases recorded, four are fractures of the humerus and two of the bones of the fore-arm. Of the four fractures of the humerus, three were complicated with paralysis of the musculo-spiral, and one with paralysis of the median and ulnar nerves, showing, as in the cases cited by Bowlby, the much greater frequency of lesions of the musculo-spiral. Of the two cases of fracture of the fore-arm, one was complicated with paralysis of the median, the other with paralysis of the posterior interosseous, a complication of which Bowlby remarks that he has been unable to find any recorded case.

As regards the mode of production of these nerve injuries, they

fall into two classes: those in which the nerve is injured simultaneously with the fracture, and those in which it becomes involved at a later period. In the first case the nerve may be injured by the same form of direct violence as causes the fracture, or by the violent displacement of portions of the fractured bone at the time of the accident. The nerve may become involved at a later period in several ways. It may be stretched or slowly compressed through imperfect reduction or subsequent displacement of the fragments; or it may become involved in and compressed by the callus about the site of fracture; or, lastly, nerves in exposed positions may be slowly compressed by splints or other apparatus used to immobilize the fractured limb.

The six cases recorded include examples of all these different modes of production. Of these, there is only one in which the symptoms can be attributed to injury of the nerve at the time of fracture through violent displacement of the fractured bone. This, however, appears to be the most probable explanation in this case, in which a compound fracture of the upper part of the shaft of the humerus was complicated with paralysis of the median and ulnar nerves. The symptoms of nerve injury appeared immediately after the accident, the hand being described by the patient as feeling "dead." The fracture was produced by direct violence applied to the outer side of the arm, and the broken ends were probably forced inward against the nerve trunks on the inner side. The fact that the belly of the biceps muscle was also completely ruptured may, on the other hand, have allowed the whole limb and the nerves with it to be violently stretched.

In two cases musculo-spiral palsy followed imperfectly reduced fracture or separation of the lower end of the humerus. The exact time, however, at which the paralysis made its appearance was unfortunately not determined. In one case it was first noted on the fifth day, and in the other not till one month after the accident. It is possible, however, in each case that it was present soon after the accident but was overlooked. The paralysis might be attributed to

pressure of callus involving the nerve. In both cases it is true there was much callus thrown out, but that involvement in callus is ever a real cause of nerve paralysis does not appear to be very well established. Unreduced displacement is probably the most important factor in all cases of so-called callus pressure.

Lastly, in two cases, in which paralysis of the posterior interosseous and median nerves respectively followed fractures of the forearm, it can, in the absence of any other probable cause, be only attributed to undue pressure from splints. There was, it is true, no direct evidence of this cause, such as is sometimes afforded by sloughs of the skin. In one case, however, the patient was afterward discovered to have complained of the tightness of the splints when they were first applied. In neither case was there any displacement or faulty union of the fragments. In one case the possibility of involvement of the nerve in callus was disproved by an exploratory operation.

The naked-eye appearance of the injured nerves was examined in three cases by an exploratory operation undertaken with a view to remove any existing cause of pressure. In none of the cases did the nerve present the slightest sign of present or past lesion; in none was there found any existing cause of pressure.

The diagnosis seldom presents any difficulty. Deanesly does not doubt, however, that cases of this kind are at times overlooked, nerve lesions not being thought of, and paralysis and contracture of muscles being confused with the general weakness and stiffness which are so often left for a considerable time after the fracture has united. This applies more particularly to lesions of the median and ulnar nerves. Paralysis of the musculo-spiral nerve produces the characteristic and familiar wrist-drop, which is little likely to be overlooked. He calls attention to two signs which should always make the surgeon suspect damage to nerve trunks in cases of fracture of the upper limb. One is, that the patient makes more than usual complaint of numbness of the fingers during the first two or three days. The other is an excessive amount of stiffness of the elbow, wrist and fingers, found when the splints are removed. Disturbance of sensation is almost always transient, but is seldom absent during the first week. Sensation is

blunted, but seldom quite abolished; sensations of numbness, tingling, etc., often persist for a considerable time. In affections of the median nerve the patient complains mostly of the tips of the index and middle fingers, less of the thumb. In affection of the musculo-spiral nerve the numbness is referred to the back of the hand and fore-arm, but in these cases complaint is less often made, and the alteration of sensation is more transient.

He makes the following further observations: Contracture both of the paralyzed and of the unopposed muscles sets in early in the case of the median nerve from the fourth to the eighth week. In musculo-spiral palsy, due to fracture of the humerus, contracture either of the paralyzed or of the unopposed muscles does not occur. Median palsy is, therefore, that which, owing to contracture, is most liable to be confused with stiffness due to prolonged immobilization. The position of the hand, however, in this case is very characteristic. When the nerve is implicated in the upper arm the patient is quite unable to supinate the hand beyond the mid position to which it is carried by the biceps and supinator longus; the wrist cannot be extended beyond the straight position; the metacarpal bone of the thumb is drawn back into the same plane as those of the fingers; and there is total inability to flex the last two joints of the index and middle fingers. The proximal phalanx can still be flexed by the action of the interossei and lumbricales. At a later time the wrist becomes considerably adducted by the unopposed action of the flexor carpi ulnaris, and the metacarpal bone of the thumb becomes approximated to that of the index finger by the similar action of the adductor pollicis. The attitude of the hand, therefore, closely resembles that which may be produced by faradizing the normal ulnar nerve in the middle of the arm. In one case, in which the median nerve was compressed in the fore-arm, the most marked feature of the hand, in addition to those just described, was the strong flexion of the little and ring fingers, due to the action of the unopposed half of the flexor profundus digitorum supplied by the ulnar nerve, and, therefore, unparalyzed. It is worthy of note that in this case contracture of this unparalyzed half of the muscle was both more severe

and more permanent than in the paralyzed muscles supplied by the median. It is this liability of contracture (organic shortening) to affect both paralyzed and unparalyzed muscles which makes the determination of the exact cause of the attitude assumed by the limb in lesions of peripheral nerve trunks so difficult to determine.

If any doubt as to the existence of nerve lesion remain after the examination of the voluntary power, sensation, and attitude of the limb, it can generally be set at rest by testing the electric excitability of the muscles and nerves to the faradic and galvanic currents. In doing this, one or two facts should be borne in mind. In the first place, when the limb has only recently been taken out of splints or plaster, the skin is usually so dry and non-conductive that the reactions cannot be accurately tested until the limb has been thoroughly washed and rubbed for several days in succession. Secondly, mere disuse of a limb from immobilization produces such a diminution of faradic excitability of all the muscles that often for several days no reaction can be obtained from a strong current. Hence diminution or loss of faradic irritability cannot be relied on as a proof of nerve lesion unless it is confined to a group of muscles supplied by a particular nerve. If loss of faradic irritability is found, some alteration, quantitative or qualitative, or both, will be found in the reaction to galvanism. In all the cases which have come under the author's notice, except one, faradic irritability had been lost; galvanic irritability, on the other hand, was retained, and in some cases increased, together with the usual qualitative alteration. In only one was there total loss of both kinds of electric excitability.

The prognosis is a point of considerable importance. It is, on the whole, extremely favorable. Only one of the six cases now recorded failed to recover. If galvanic irritability is not lost at the end of a month from the time of injury, a favorable result may always be expected under proper treatment. The time varied from three to twelve months. It was more rapid in children than in adults.

The treatment consists in passive movement, friction, and electrical stimulation of the affected muscles and nerves. As a rule, no

attempt should be made to deal with the nerve injury until the fracture is soundly united—that is, from four to eight weeks after the injury. Adhesions and contracture should then be dealt with, an anæsthetic being used, if necessary. The whole limb should then be treated with systematic rubbing and with electricity. Whether for this purpose the interrupted or constant current should be used is a subject of dispute. At present it is generally recommended to use the constant current, to which the muscles still respond. It is certain, however, that the beneficial effects of electricity do not entirely depend on its producing a muscular contraction. The efficiency of faradism, even after the muscles have ceased to respond to it, is indisputable. Duchenne, to whom we owe the use of electricity in muscular paralysis, produced his remarkable cures entirely with the faradic current. One of Deanesly's cases was also successfully treated by faradism alone. The nerve may often be faradized above the seat of lesion, and the muscles may in this way be got to respond long before volitional impulses are able to pass. If desired, the faradic current may be applied daily by a nurse or friend, and the galvanic once or twice a week by the surgeon himself.

The question of operation will naturally arise in many of these cases. No operation should be advised unless there is reason to believe that there still exists some pressure or traction on the nerve which can be relieved. Deanesly believes that the number of cases in which such a condition exists is small. Of the three cases in which an exploratory operation was done no sign of still existing pressure was discovered in any: in one the nerve lay in a groove of callus, but there was no evidence that it was compressed by it. If, however, there is any condition such as marked displacement of bony fragments, or any other cause which seems remediable by operation, no hesitation need be had in undertaking it and at least ascertaining the actual state of the nerve.—*British Medical Journal*, June 17, 1893.

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